ABSTRACT

A carbon fiber-carbon matrix reinforced ceramic composite comprises a carbon fiber-carbon matrix reinforcement embedded within a ceramic matrix. The ceramic matrix does not penetrate into the carbon fiber-carbon matrix reinforcement to any significant degree. The carbide matrix is a formed in situ solid carbide of at least one metal having a melting point above about 1850 degrees centigrade. At least when the composite is intended to operate between approximately 1500 and 2000 degrees centigrade for extended periods of time the solid carbide with the embedded reinforcement is formed first by reaction infiltration. Molten silicon is then diffused into the carbide. The molten silicon diffuses preferentially into the carbide matrix but not to any significant degree into the carbon-carbon reinforcement. Where the composite is intended to operate between approximately 2000 and 2700 degrees centigrade for extended periods of time such diffusion of molten silicon into the carbide is optional and generally preferred, but not essential.